



Banking & Financial Services

White Paper

## Leveraging Digital Technologies for Effective Risk Management (Part 2)

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# Executive Summary

Risk and compliance costs have skyrocketed since the financial crisis, catalyzed by a combination of heavy prudential regulations, strict conduct supervision, and deep structural market changes. Industry regulators across various jurisdictions are demanding a significant expansion of reported data to evaluate market activity. Despite the recognition for greater efficiency, the reality of walking the path of change remains a difficult journey for financial institutions, insurers, and investment managers alike.

In the first part of this white paper, we discussed the execution levers required to align risk and finance capabilities to achieve cohesive risk-enabled financial decisions. In this part, we focus on strategic imperatives and tactical steps required to evolve toward real-time risk management, and eventually prepare risk management capabilities for digitization trends sweeping various parts of the financial services value chain. In order to respond, reposition, and eventually thrive, TCS believes that these capabilities, complementary and synergistic, can be addressed concurrently.

**1. Real-time risk management capabilities as a paradigm:** In a new world, against the backdrop of round-the-clock, real-time transactions, the existing paradigm of batch processing in middle and back offices, represents an operational disconnect between risk-taking and risk control activities. This further results in inadequacy in meeting emerging requirements for the future. In order to successfully evolve toward a real-time paradigm, firms must lay the right foundations for this change, based on the following:

- Align velocity requirements and processing intensity to ensure that latency implications fit with future or emerging requirements.
- Map out and trace the efficiency of existing risk data or information production chains to understand applications and/or systems landscape, data paths, and bottlenecks. This will enable IT architects to subsequently identify gaps across the value chain and the architectural components necessary for enhancement (or replacement).
- Enhance architectural foundations for the right performance levels. Ensure that architectural components are designed to operate at different speeds in controlling risk — real-time or near real-time, intraday snapshots, or end of day views (as dictated by the velocity of trading, asset class, and potential market conditions).
- Drive a flexible and agile data integration and middleware strategy for risk management technology to ensure that data access facilities for risk systems are adept to make data sufficiently pervasive and consumable, especially at critical customer and transaction touch points where risk information is used to facilitate effective decisions. Firms must invest and implement long-term

approaches to employ orchestration layers that reuse legacy capabilities and offer more flexibility in processing logic, such as through service-oriented IT development and interfacing approaches.

- Reengineer business operations and transactional workflows for real-time decisions on an end-to-end basis. Firms will need to approach technology investment decisions based on holistic end-to-end impact and opportunity. There are opportunities to enhance decision-making processes by exploiting real-time aggregated risk and finance data, thereby enabling timely risk-based decisions to enrich customer interactions. These will also facilitate more effective, dynamic integration of risk controls into front line functions and sales channels. When upgrading IT components, firms must redesign workflows, at all stages of the process, in an orchestrated manner to incorporate risk information provisions into day-by-day trading or credit decision processes. Reengineering exercises should also aim to simplify or automate existing processes, as well as reduce complexities in the existing IT systems landscape within the firm.

**2. Risk management digitization and enablement.** The broader shift toward ‘digital’ is driven by a set of interrelated, technology-led changes that influence customer demands, expectations, and behavior, in turn impacting risk management and compliance operations. In order to be successful, firms must:

- Focus on experiences of both internal and external clients. Firms must follow digital trends and understand their potential impact on customer and end user behavior – their decision-making priorities, the manner in which they engage with a firm, and expectations from a product or service.
- Digitize internal risk, audit, and compliance management operating models to improve process orchestration and STP from the outside in. Digitization requires a fundamental change in a bank’s operating model. Delivering the desired customer experience in the digital world is impossible without altering products and services, organizational models, and technology landscapes.
- Build and strengthen digitally-oriented risk data and analytics Centre of Excellence (CoE). The implementation of a Centre of Excellence for digital, risk analytics, and data management, ensures that firms drive, grow, and evolve strategies to digitize risk processes for superior outcomes. Depending on the degree of maturity for data and analytics enablement, firms can explore different enabling environments and operating models to ensure better alignment of data or analytics initiatives and resource allocation, without disrupting day-to-day production activities and/or deadlines for regulatory compliance requirements.
- Organize business and technology for flexibility and agility in your operating model. Digital demands are just too different from traditional IT. To cope with such demands, many IT

organizations are considering setting up two different teams — one dedicated to digital initiatives, and another for traditional day-to-day tasks. When implementing change initiatives, business and IT must understand both the granular detail and the big picture. This will help to drive changes at an iterative, incremental basis by employing agile technology development methods. Firms should ensure that change is led by business needs and not to merely adopt new digital technologies.

- Implement a cohesive applications strategy to overcome legacy constraints. To enhance capabilities on a continual basis, firms need to craft and execute IT strategies to reverse misaligned legacy decisions around the lack of standards, rationalization of application portfolios, and simplification of IT environment (for example, create a lean front-to-back, design horizontal architecture stacks, remove complexity, and retire overlapping legacy applications).
- Ensure that the data middleware layer is fit for purpose. Similar to developing real-time risk management capabilities, it is important that firms chart a roadmap to ensure that data integration and data access facilities for risk systems are loosely coupled. In addition, these systems need to be flexibly integrated, especially at junctures where risk information is weaved in, to facilitate effective and timely decision-making.
- Be clear about the context of how economic value will be derived. To fully realize the benefits associated with digitization initiatives, firms will need to consider all three levers together – revenue, risk cost mitigation, and operational cost optimization.

As we consider next generation capabilities, we see competitive and regulatory pressures driving the industrialization agenda around risk data and platforms, with enhanced requirements for infrastructure and platform capabilities to meet emerging standards for a new financial ecosystem. In the future, the risk information production function will operate like a factory, and perhaps eventually even as a utility, in parts of the value chain. Real-time and digital capabilities for risk management will be key for banks to strengthen and industrialize operations and technology.

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# Market Dynamics Are Exposing Operational Vulnerabilities And Opening Latent Sources Of Risk

Despite the reforms since the financial crisis, scorecards of financial institutions do not reflect an industry that has fully come to terms with its role and has been restored to a normative state of wellbeing. The statistics highlighted in Figure 1 are a snapshot; it is difficult to deny that there is still work to be done to get the financial industry back to full health.

**“** In a new world where there are shifts towards costly, more intrusive and data-intensive regulatory regimes, the ability to achieve scale, reliability and transparency at the right operational economics will be a winning factor for financial services business models

- Celent **”**

New threats and risks	Operational inefficiencies	Imperatives for change
<b>\$104 BN</b> at stake in cumulative bills associated with European bank conduct risk and litigation activities in 2014  <i>Source: FT</i>	<b>64%</b> of industry participants are concerned about operational robustness of collateral management operations  <i>Source: Oliver Wyman</i>	<b>30 - 50%</b> potential cost savings by embracing emerging KYC industry utilities  <i>Source: Celent estimates</i>
<b>23%</b> growth p.a. in registered cyber-attacks around the world since 2010  <i>Source: Oliver Wyman</i>	<b>100 - 500 persons per bank</b> potentially involved in US regulatory stress testing and CCAR exercises during peak seasons  <i>Source: Celent, market interviews</i>	<b>79%</b> believe that innovation is critically important due to customer expectations changing rapidly, so the industry is under pressure to keep up  <i>Source: Celent</i>
<b>&gt;\$56 BN</b> in fines imposed for misconduct by US regulators in 2014  <i>Source: FT</i>	<b>67%</b> believe that heightened regulatory scrutiny and compliance requirements are a source of operational complexity  <i>Source: Oliver Wyman</i>	<b>&lt;45%</b> indicate that sources and symptoms of complexity is well managed today within their organizations  <i>Source: Oliver Wyman</i>

**Figure 1: Market and regulatory dynamics are exposing vulnerabilities to latent risk**

*Source: Celent<sup>1</sup>, FT Alphaville<sup>2</sup>, FT<sup>3</sup>, Oliver Wyman<sup>4,5</sup>, Market Interviews*

With financial stability being the foremost in the minds of governments, business stakeholders, and regulators, financial authorities are driving for more extensive and timely reporting requirements to facilitate greater levels of transparency in the way transactions are conducted, and to increase the amount of pre- and post-trade information available to market participants. Firms operating in various jurisdictions are finding that regulators require a significant expansion of reported data to evaluate market activity. With a visible increase in regulatory oversight, related costs and overheads are on the rise.

[1] Celent, "Emergence of a Utility Model: The Case of KYC On-Boarding Solutions" (September 2014), <http://www.celent.com/reports/emergence-utility-model-case-kyc-boarding-solutions>

[2] FT Alphaville, "Litigation risk, charted" (June 2014), <http://ftalphaville.ft.com/2014/06/04/1869002/litigation-riskcharted/>

[3] Financial Times, "Regulators slap \$4.3bn on six banks in global forex probe" (November 2014), <http://www.ft.com/cms/s/0/aa812316-69be-11e4-9f65-00144feabdc0.html#slide0>

[4] Oliver Wyman, "Managing Complexity: The State of the Financial Services Industry 2015", [http://www.oliverwyman.com/content/dam/oliver-wyman/global/en/2015/jan/SoFS-2015/State\\_of\\_the\\_Financial\\_Services\\_Industry\\_Report\\_2015.pdf](http://www.oliverwyman.com/content/dam/oliver-wyman/global/en/2015/jan/SoFS-2015/State_of_the_Financial_Services_Industry_Report_2015.pdf)

[5] Oliver Wyman, "A New Approach to Cybersecurity", <http://www.oliverwyman.com/insights/publications/2014/jul/a-new-approach-to-cybersecurity.html#.Va84c6Sqko>

Risk and compliance costs have skyrocketed since the financial crisis, catalyzed by a combination of heavy prudential regulations, strict conduct supervision, and deep structural market changes. This 'perfect storm' is creating a transient environment that is potentially destabilizing (at least in the near-term), at the same time, it also opens latent sources of risk and exposes operational vulnerabilities. Despite the industry's lobbying and kickback against what it calls 'misdirected regulations', the trajectory in terms of emerging and future regulations is clear – there will be more of it.

Hence, conventional notions of addressing incremental change may not suffice – more radical solutions need to be found. We believe that this will require CROs, CFOs, COOs, and IT strategists to radically envision and rethink their regulatory and risk management operations and technology strategies.

## Firms Must Raise The Bar On Risk Management Operations And Technology...

From a regulatory and risk management standpoint, the industrialization agenda around risk technology and operations is already upon us, but firms on the whole still need to address maturity gaps in many parts of the information delivery value chain. Traditional limitations of middle and back offices, whether you are a retail bank, corporate investment bank, or an asset management firm – can no longer be tolerated as an excuse for vulnerabilities in the front office.

At the same time, regulatory supervision is becoming highly stringent, and regulators today demand much more from banks, insurers, and investment firms – raising the bar along all parts of an institution's value chain in terms of data collection, risk analysis, monitoring, and reporting. This is already fast becoming a minimum acceptable norm, even though the reality remains a work in progress and leaves more to be desired at many firms. Forward-looking firms have already realized that in the new world characterized by costly, data-intensive, and stringent regulations, the ability to achieve scale, reliability, and transparency (at optimum operational economics) will be a winning factor for a business. Unfortunately, this is still not the norm.

## ... And To Renew Ambitions For Next Generation Capabilities

In the coming years, if not already, certain geographical regions like North America and Europe will witness a series of regulations, making the management of regulatory response programs a spiraling dynamic that financial firms have to master as a core competence. Hence, financial institutions must steer business change and IT transformation objectives guided by a clear vision of next generation capabilities both at tactical and strategic levels.

Regulators are increasingly mandating financial firms to report extensive amount of data, with as much granularity as possible, to evaluate market activity and keep risks in check.

To respond, reposition, and eventually thrive in the coming times, three strategic capabilities in risk management operations, when executed well, will differentiate leaders:

1. Cohesive risk and finance decision-making
2. Real-time risk management capabilities as a paradigm
3. Risk management digitization and enablement

We understand that financial firms are walking a tightrope to achieve balanced priorities and operational and IT strategies to:

- change versus run the bank,
- enhance transparency and absorb related costs,
- achieve localized responsiveness versus centralized mobilization, and finally,
- ensure that current compliance efforts do not crowd out and stifle innovation.

The capability themes we propose are key building blocks that will enable firms to traverse the fast-changing regulatory environment and meet the multi-faceted requirements of various markets.

Having discussed the execution levels required for risk and finance alignment in part one of this report, we now focus on the strategic imperatives and tactical steps required for real-time risk management and digitization of the entire risk landscape.

## Toward Real-time Risk Management Paradigm

### Issues And Pain Points

Since the 2008 financial crisis, there has been a relentless focus on risk governance. Intense attention is being paid to assess the efficacy of risk control functions and checks and balances implemented to keep frontline risk-taking activities in control. However, despite systems rationalization and complexity reduction efforts over the past few years, barriers to change are still significant and the path to real-time risk management is impeded by several points of disconnect.

In a new world, against the backdrop of round-the-clock, real-time (or near real-time) transactions in frontline web and digital channels, the existing paradigm of batch processing in middle and back offices represents an operational disconnect between risk-taking and risk control activities. This in turn leads to inadequacy in meeting emerging requirements for the future. For example, today's systems take hours, at times days, to produce counterparty exposure reports during stressed or default scenarios. It is inadequate that limits checking and control is executed in a batch mode at the end of day rather than at the point of transaction. Product control processes for detection of anomalies, reconciliation, and execution of P&L approvals are still highly manual. Increasingly, it is becoming inadequate to adopt static liquidity forecasting practices in scenarios and markets where liquidity can quickly evaporate through complex market interconnectedness and volatility.

Front, middle, and back offices typically operate at different speeds (shown in Figure 2), hampered by siloed applications and data, inconsistent data definitions, fragmented position-keeping, non real-time interfaces, and a lack of front-to-back straight-through processing.

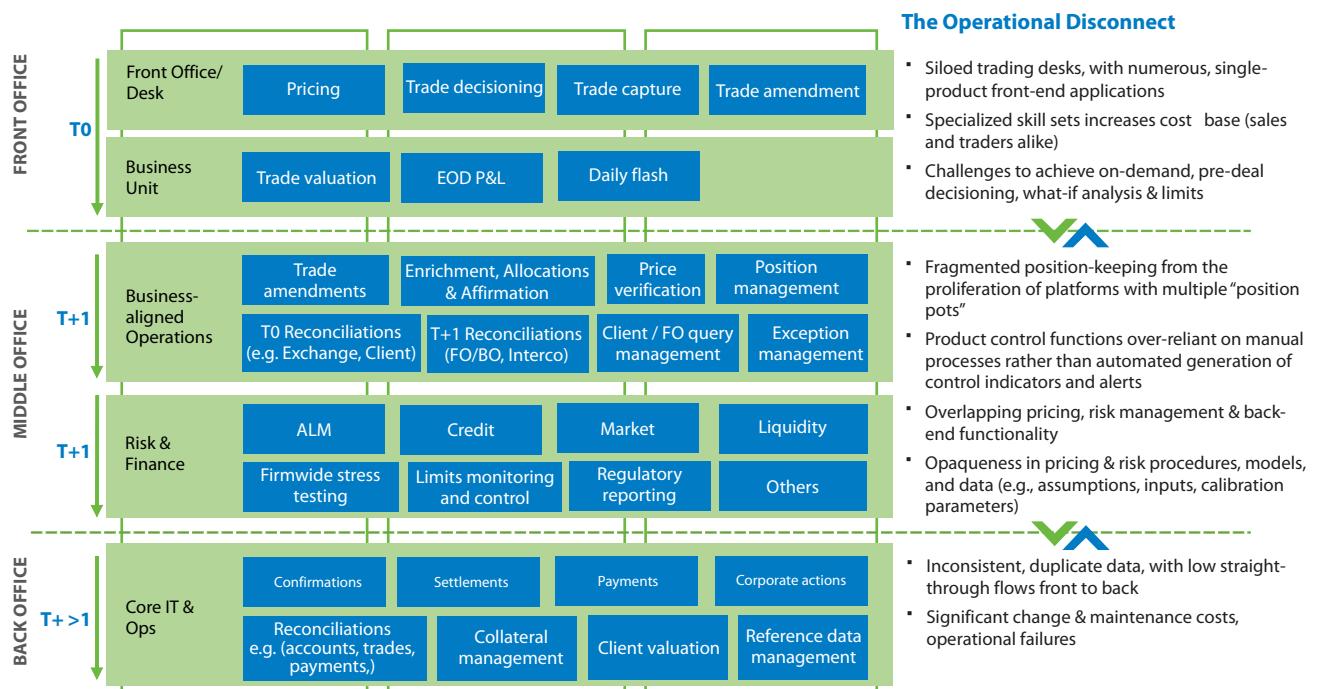


Figure 2: The real-time dilemma: Front to back operational disconnect (Trading and securities example)

Source: Celent<sup>6</sup>

The most common scenario we see is front office activities related to transaction initiation, pricing, and order or trade capture being done in real-time (T0). However, due to disparate data and systems, middle and back office operations such as product control, reconciliations, limits, and risk or VaR computation lag in terms of latency.

## Drivers For Change

Drivers that are likely to shape investments and adoption for real-time capabilities are determined by business and domain-specific regulations, applications, and market dynamics. However, depending on the line of business, products, and regulatory environment, the idea of 'real time' in each context: banking, insurance, securities, and investment management firms can carry different notions. We see glimpses of where vulnerabilities associated with operational disconnects between risk-taking and risk control activities have been exposed, where real-time capabilities are required, and where things are evolving. For instance:

[6] Celent, "Back to the Future for Risk: Towards Real-Time Paradigms", <http://www.celent.com/reports/back-future-risk-management-realizing-promise-true-riskreward-decisions>

- The securities industry has been on the leading – some may perhaps say, bleeding – edge of real-time, for example, with the advent of low latency or high frequency trading, and the consequences of a lack of industry-level controls to mitigate fast-moving risks (as illustrated by 'flash crash' market incidents in recent years). Both regulators and regulated firms are now charged with addressing financial and operational vulnerabilities to avoid incidents that pose a threat of systemic risk in the future.

For example, Europe's MiFID II regulatory framework requires firms that use and provide direct electronic access services to incorporate pre-set trading, credit thresholds, and risk controls. It requires trading platforms to have risk controls, thresholds on trading, and a 'kill' functionality to stop orders or trading (for example, when a trading algorithm malfunctions). New standards also require clearing participants to have trading or position limits for their clients and real-time monitoring. Investment firms are required to have real-time trade information and reconciliation. To achieve this, CCP service providers are streamlining processes to eliminate the use of paper, and introducing standardized and automated messages to better monitoring and control of limit breaches in real time. For example, CCPs becoming real-time aggregators of risk positions and exposures across different markets, as well as across CCP cleared and non-CCP transactions.

- With heightened regulatory and capital overheads, markets, businesses, and trading desks especially, are now compelled to monitor the consumption of capital and move toward risk-based pricing by loading all new costs resulting from regulatory requirements, increasing credit value adjustments (CVA), liquidity premiums, and other risk-weighted assets (RWAs) when writing new business. Banks now need to fully reflect the increased risk and regulatory overheads when entering new deals, by embedding new metrics into decision-making processes in the front line. All these require a significant degree of orchestration from a workflow, data, and systems integration perspective.<sup>7</sup>
- Retail and commercial banking continues to undergo a shift toward real-time processing. These banks are witnessing increased scrutiny of business practices to ensure fair treatment of customers. This increased rigor is pushing banks to implement real-time capabilities for effective risk-based controls and related decision-making to ensure customers are treated fairly throughout the sales process. With continuing innovation and shifts in payment services, banks are looking to implement real- or near real-time liquidity monitoring tools and effective frameworks. These will enable accurate measurement and management of intraday liquidity risk to meet both customer and market obligations.
- In the insurance sector, over the last decade, most systems have been made online and organizations have gone all out to make systems available round the clock – especially in the P&C space in markets where price aggregators have become dominant (such as UK Personal Lines). In these markets, near real-time is a must when it comes to pricing products, and best-in-class insurers analyze their pricing performance and make multiple changes several times a day, in order to adjust their positioning in the list of returned quotes. However, insurers that can do this are still few and far between, and the capability is normally limited to pricing or quotations and areas such as insurance contract management where normal slow business operations continue to remain. Real-time capabilities are particularly crucial in markets where there are startup price aggregators and comparison players within them. Furthermore, with the advent of personalized insurance products and changes in insurance business models, this is pushing the industry to employ real-time data for enabling effective complex actuarial decisions (for example, pricing adjustments for a car insurance based on customer behavior).

## Strategic Options And Approaches

Despite implicit pressures and resultant efforts toward achieving real-time capabilities, the journey has been patchy so far. Discussions with financial firms have indicated that the business case for investments in real-time capabilities often fails to justify, and is executed in tandem within the framework around characteristics of business transactions, velocity of risk-taking, and control mechanisms required.

As firms architect for innovation in next generation risk ecosystems, each firm must chalk out and develop business use cases to understand how latency requirements feature in new capabilities and potential risks to the business where there is a disparity between risk taking and risk control activities.

To meet regulatory requirements, financial firms have begun to deploy real-time risk management capabilities. However, the journey has been patchy so far. Efforts in this space need to be invigorated.

## Action Points And Recommendations

The notion of real-time is not merely one of being instantaneous in a specific part of a transaction chain, but it encompasses an end-to-end approach where a transaction lifecycle, both within a financial firm and across external parts of the chain, need to be compressed in terms of latency. Here, although we expect the journey toward a real-time paradigm to evolve gradually with starts and stops, the overall trajectory is fairly clear. Hence, financial services firms must consider the following:

- **Align velocity requirements and processing intensity.** Firms must understand the velocity requirements and processing intensity for risk processes and information production to ensure that latency implications align with future or emerging requirements. Two dynamics are reflective of where the industry is headed. First, more intensive processing requirements are required to enable greater sophistication and deeper granularity from higher volumes of data at a firm-wide basis. Second, velocity requirements are being compressed from weeks and days to intraday, and at least near real-time for business transactions that are to be necessarily monitored and controlled. Firms should ‘right speed’ latency in accordance with the velocity of risk in different parts of the firm’s portfolio (for example, cash equities, cash fixed income, cleared versus bilateral derivatives), and the urgency of risk information under different conditions (for example, normal versus stressed). Figure 3 highlights various risk management activities and latency requirements needed to meet the emerging demands in business.
- **Map out and trace the efficiency of existing risk data or information production chains.** The rationale for this step is for firms to understand applications or systems landscape, data paths, and bottlenecks. By seeking to understand risk information production chains for various measures, firms can identify bottlenecks and critical paths (for example, for market risk VaR, credit risk VaR, CVA, RWA, and more, often produced by different systems). This will enable IT architects to subsequently identify gaps across the value chain and what architectural components are necessary for enhancement (or replacement).

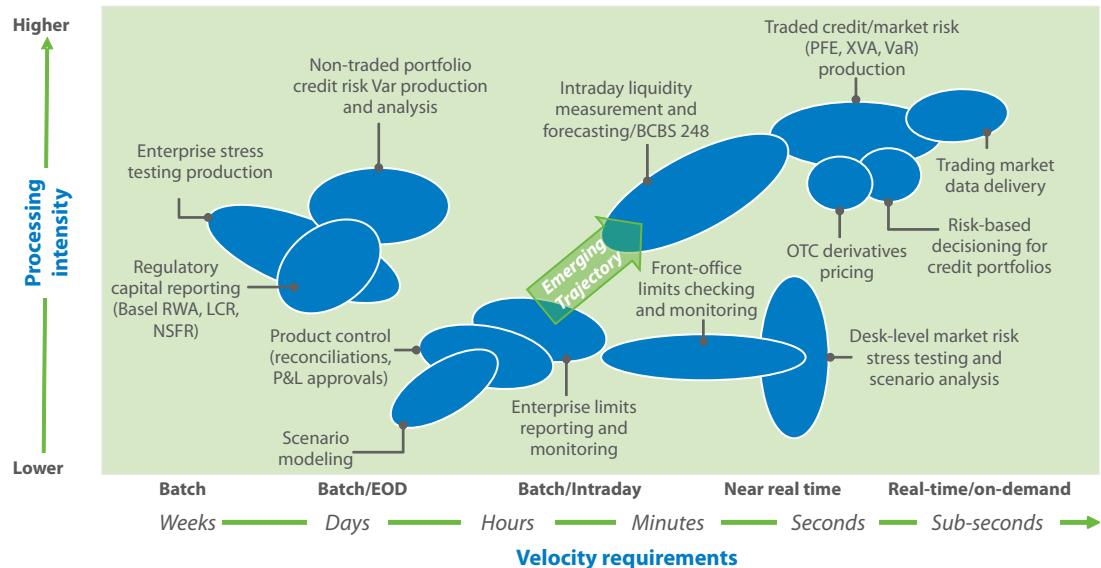


Figure 3: Aligning velocity and processing requirements with emerging demands (Illustrative)

Source: Celent6

[6] Celent, "Back to the Future for Risk: Towards Real-Time Paradigms", <http://www.celent.com/reports/back-future-risk-management-realizing-promise-true-riskreward-decisions>

- **Enhance architectural foundations for the right performance levels.** Firms must ensure that architectural components are designed to operate at different speeds in controlling risk — real-time or near real-time, intraday snapshots, or end of day views, as dictated by the velocity of trading, asset class, transactional channels, and condition of markets. For instance:
  - Common, streamlined, and in-time trade, reference, and market data sourcing improves the freshness and timeliness of information.
  - Recent advancements in the areas of high-performance computing and Big Data are already extending realistic options for achieving real-time risk monitoring. Firms can leverage emerging in-memory database, analytics, parallel processing, and other high-performance technologies.

- **Drive a flexible and agile data integration and middleware strategy for risk management technology.** With risk data and information playing into core transactions, business planning, and operational decisions, it is important that firms chart a roadmap to ensure that architectural and data access facilities for risk systems are adept to make data pervasive and consumable (subject to the appropriate rights of access), especially at critical customer and transaction touch points where risk information is used to facilitate effective decisions. Integration strategies and technologies are readily available to achieve these objectives.

For instance, when service-oriented architectures (SOA) were introduced more than two decades ago, this paradigm for software development was mostly used to access back-end legacy systems, with the benefits of reducing data fragmentation and easing systems development. These benefits have not changed, but we believe that SOA is ready for a redefinition and resurgence in terms of how it is utilized, due to the following dynamics. Rather than this being a technology development paradigm to solve a technical problem, there are now market scenarios and business dynamics within financial services where the characteristics of service orientation cater to changing business needs:

- Emerging requirements to integrate or enhance systems and new market infrastructures such as SEFs or OTFs, CCPs, and trade reporting repositories, as well as for margining, collateral, and risk calculations.
- The proliferation of multichannel end usage points (desktops, mobile, tablets, web), cloud computing, and virtualization makes web service orientation, sharing of IT services, and associated apps uniquely suited to cloud and social network platforms.
- Services can be defined, orchestrated, and more importantly, shared across business processes and segments of the centralized workflows (for example, client KYC assessments, limits monitoring, position or exposure reporting, and pre-transaction regulatory capital impact checks are information services that can be shared across business lines).
- The opening up of selected internal IT and web services to third parties is becoming a competitive dimension, usually as part of a broader product or service offering to clients. Here, firms can unlock real-time risk information services for other business units and divisions by allowing multiple stakeholders and other applications to use service-oriented access to risk analytics and functions (for example, in the context of prime brokerage, the ability to provide hedge fund clients with VaR and margin calculations on the cloud, through direct web services, in addition to website facilities). This can be done by ensuring that functionality within risk systems are architected based on open, service-oriented application interfaces that facilitate interoperability between heterogeneous systems.

In short, firms must invest in and implement long-term approaches to employ orchestration layers that reuse legacy capabilities and offer more flexibility in processing logic.

- **Redesign business operations and transactional workflows for real-time decision-making on an end-to-end basis.** When upgrading IT components, firms must reexamine and (re)design workflows, at all stages of the process in an orchestrated manner, rather than in isolated parts of the chain. The broader goal here is to drive integration between risk information provisions and day-by-day trading or credit decision-making processes in order to achieve tangible operational improvements. In executing this exercise, firms should bear in mind to ensure that target processes and operational models should, as much as possible, protect the majority of existing investments and allow firms to reconfigure (or migrate) existing components for real-time use. In our experience, part of this redesign will serve to simplify or automate existing processes, as well as reduce complexities in the firm's existing IT landscape. Organizations will need to approach investment decisions based on holistic end-to-end impact and opportunity analysis, hence this is likely to be a mix of both tactical and strategic decisions.

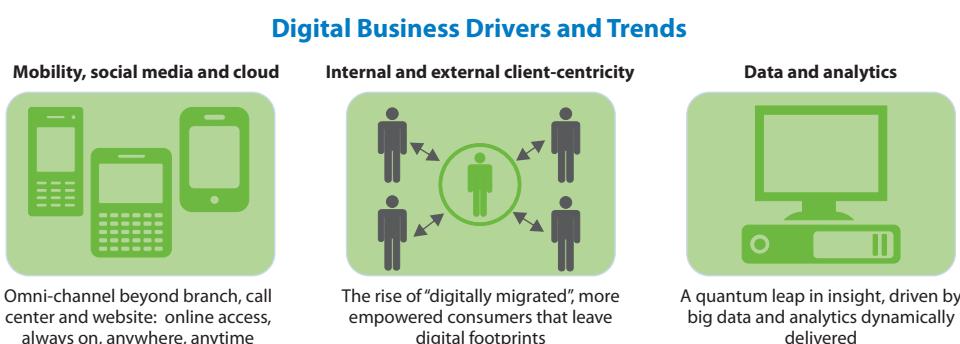
Looking forward, as banks, insurers, investment managers, and trading firms face heavier regulations, disruptive technologies and relatively more agile startup firms, the industry as a whole will transition to a real-time paradigm for operations. The disruption may be gradual but it will be profound, and hence firms must build appropriate foundations for this change.

The traditional service oriented architecture is set to be redefined in terms of how it is leveraged. Instead of being viewed from just the technology lens, organizations need to see it as a vital business driver.

# Risk Management Digitization And Enablement

## Issues And Pain Points

We characterize digitization as a set of interrelated, technology-led changes that impact customer demand, expectations, and behavior, as well as competitor and substitute activity, resulting in disruptive changes in the nature and rules of an incumbent's competitive landscape. Digitization, although loosely-defined, is nevertheless a real phenomenon that is influencing all industries, with startups threatening incumbents, and creating opportunities for firms to execute business strategies through digitized business operations. At present, the forces of digitization are most acutely encountered in the context of customer-facing functions such as online marketing, sales or service channels, and social media interactions.



**Figure 4: Digitization drivers and trends**

Source: Celent<sup>6</sup>

However, the increasing impact of digitization on core parts of a financial firm's client-facing and transactional value chain will mean that front line risk takers and risk controllers will need to respond to the evolving nature of how risk is originated, assessed, transformed, and managed in a 'hyper speed', interconnected digital world. After all, banking, insurance, and investment management firms are risk-based businesses where good decision-making can rapidly drive returns, and a lack of responsiveness can be a latent source of risk.

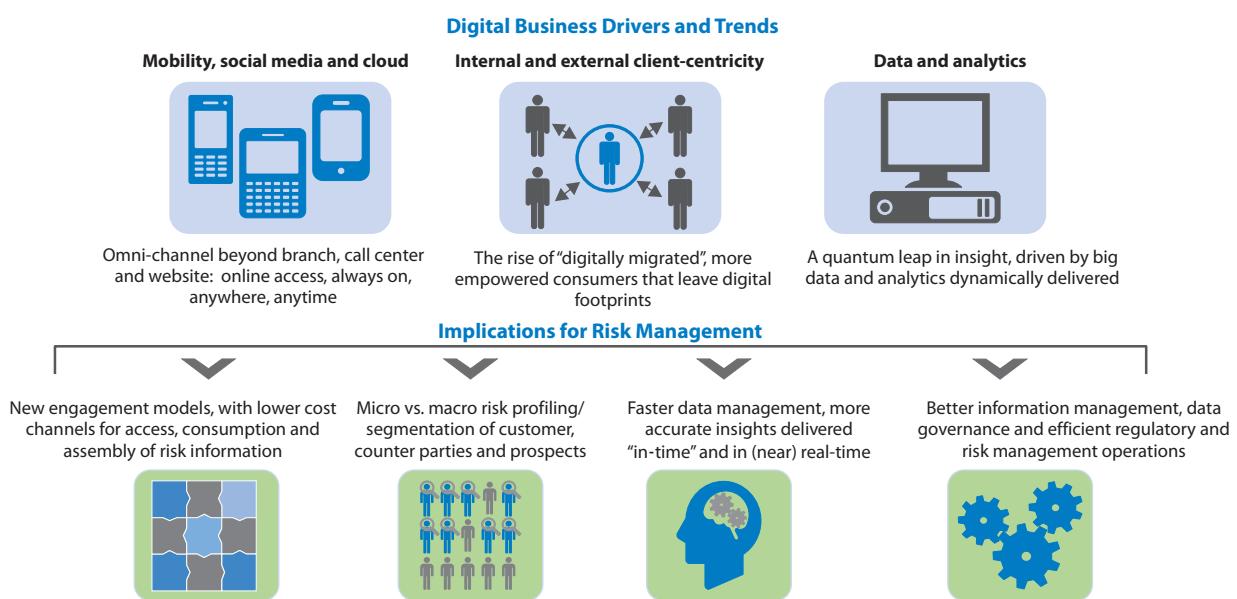
For instance, the lack of straight-through risk management processes and coherent information are leading to increased TCO, and an inability for risk managers to derive insights and respond in a timely manner to risk events. Here, emerging digital capabilities hold the potential to stimulate broader, more strategic discussions beyond conventional 'faster, cheaper' notions of managing risk typically associated with high-performance technology enhancements and new software functionalities.

Emerging digital capabilities hold the potential to stimulate broader, more strategic discussions beyond conventional 'faster, cheaper' notions of managing risk, typically associated with high-performance technology enhancements.

# Drivers For Change

We believe that the CRO needs to consider three strategically pertinent implications around evolving digitization themes in relation to risk management effectiveness and efficiency (as illustrated in Figure 5):

- Firstly, the proliferation and growth in digital channels (omni-channel online access that is always on, anytime, anywhere) through which customers search for, interact, and transact with businesses, and among themselves. These have profound implications for how firms run and manage their businesses, and are least related to increased risks of cyber-attacks and fraud.
- Secondly, the rise of digitally migrated, more empowered prospects and customers leaving digital footprints, mean that firms can employ more advanced risk profiling or segmentation techniques around customers, counterparties, and prospects (at both micro and macro levels). This will enable digitally savvy firms to identify and serve the most profitable customers, much to the disadvantage of firms that do not develop these capabilities.
- Thirdly, the quantum leap in technologies that are able to dynamically deliver timely insights, driven by faster data management, Big Data approaches and analytics will yield more accurate insights delivered in (near) real-time. This 'hyper speed paradigm' of transactional delivery and risk-taking requires comparable capabilities for limits, risk, and compliance monitoring and control. These are already stretching the limits of the current end-of-day (batch-oriented) operations inherent in today's financial services firms.



**Figure 5: Digitization and next generation risk management capabilities**

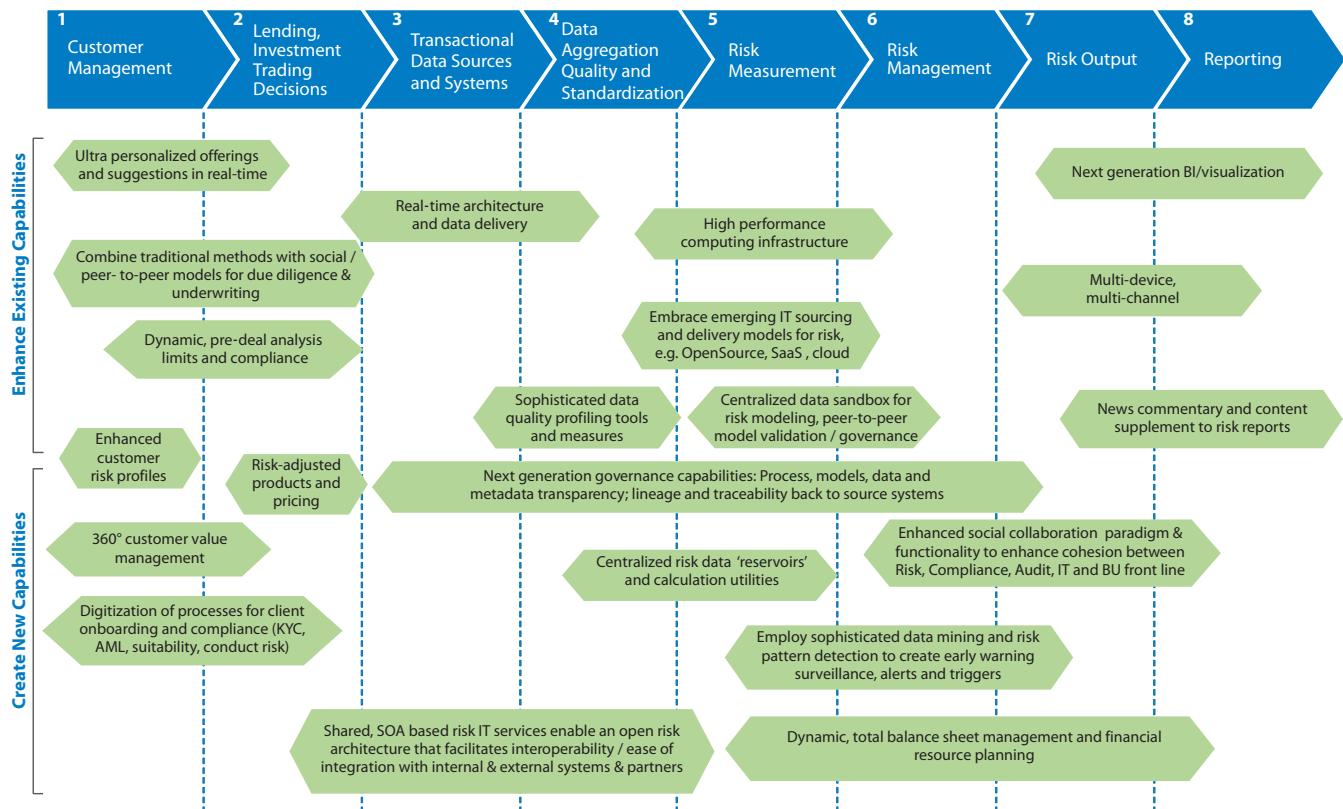
Source: Celent6

In addition to emerging digital business models being potentially disruptive to incumbents, firms that are pushing new levels of digitization provide a preview into the possibilities of next generation capabilities and enhanced value propositions. Incumbents must not be complacent and risk managers need to be cognizant of what new opportunities and threats could potentially lie ahead.

# Strategic Options And Approaches

In looking at the risk value chain, we see opportunities for financial services firms to draw out the greatest value for digitizing their business models in various areas. Figure 6 provides an illustration of a transactional value chain and firms must begin exploring options and use cases for digitization of risk, regulatory, and compliance processes. Notable examples include:

- **Credit underwriting:** Augment traditional approaches for underwriting and risk assessment (for example, in retail credit underwriting, for counterparty risk assessments) using client interactions, social media, and peer-to-peer data. With digitally migrated prospects and customers, firms need to build capabilities around digitally enabled risk segmentations of prospects to enable effective marketing campaigns, and a more accurate pricing of risk to drive revenues and enhance profitability.
- **Reputational risk management:** Develop enhanced, data-driven reputational risk monitoring and mitigation approaches that can handle the increased velocity of information through social media in the digital world. Furthermore, news and commentary about the firm's and counterparties' reputation profiles can be incorporated to supplement risk reports.
- **Conduct risk:** Employ sophisticated unstructured data mining and pattern detection algorithms to manage and report conduct risk (related to sales, product suitability, mis-selling) at the point of transaction.
- **Centralized risk data utilities:** Consolidate and 'sandbox' risk and finance-related market and reference data into a Big Data reservoir to improve access and consistency of information for risk modeling and model validation activities.
- **Digitization of risk management operations:** Employ a combination of digital, Big Data, and integration technologies to raise levels of automation and transparency. For example, recent demands for regulatory stress-testing activities will require the next-generation enterprise to flexibly integrate these with the existing ecosystem of tools and/or analytics solutions. For instance, to incorporate third party components (like econometric satellite models for credit losses, income, credit growth, and so on), and to reduce the costs of model development or integration. Furthermore, digitization through cloud-based services can also be included to reduce capital expenditure and improve the time to market for new capabilities.

**Figure 6: Digitization opportunities and strategies in the risk management value chain (Illustrative)**

Source: Celent6

### Opportunities for change: Digitizing regulatory stress testing and reporting processes

In the post-crisis banking regime, stress-testing has become a tool of choice among regulators. This is because of the enhanced disclosures of results from supervisory stress tests as well as the requirements to tie firms' management actions to their quantitative results. Specifically, due to the perceived success of US Comprehensive Capital Analysis and Review (CCAR) and ECB's Comprehensive Assessment, regulators in other jurisdictions are likely to further expand the use of stress testing as a supervisory tool. Hence, firm-wide stress-testing in terms of methodological scope and granularity, as well as operationally into a regular, business-as-usual activity, has become a top of the mind issue for the global financial industry, even though the reality at many firms is very different. Although the specifics in terms of exact scope and timeframes are uncertain, we expect the direction of progress for stress testing is likely to mirror developments that we have seen for CCAR in the US. For example, regulators like the UK Bank of England, Prudential Regulation Authority (PRA), and European Banking Authority (EBA) are already showing signs that they are likely to adopt a similar degree of rigor, breadth, and intensity in the way they deal with systemically important firms.

Anecdotally, in the US, during peak seasons, as many as 500 people may be working on an institution's CCAR submission (depending on the size and complexity of the bank). Furthermore, follow-ups from the Fed can generate more than 1,000 queries. Hence, it is not difficult to understand why firms are focused on higher levels of automation and process efficiencies. Firms need to accelerate their search for the industrialization of stress-testing infrastructure and activities in terms of economies of scope and scale toward shared data

architectures, flexible platforms, and repeatable operations. These will require next-generation enterprise stress-testing platforms to be integrated with 'open box' characteristics, yet be sufficiently flexible to support an ecosystem of tools or analytics and incorporate third party components (for example, econometric satellite models for credit losses, income, credit growth, and so on). Here, we believe there are a number of areas for firms to exploit in terms of digitization themes:

- **Stress testing data management:** Adding new data to existing stress test models can help to improve management and regulator confidence in models and related assumptions. Many firms have begun developing enterprise-wide stress tests that also include counterparty, liquidity, market, and operational risks. More sophisticated and comprehensive stress-test models can result in huge data files. Big Data tools such as Hadoop and MapReduce can improve data aggregation as well as improve processing speed of projects by leveraging parallel processing and grid computing. Running stress tests quickly, and having a library of prebuilt stress tests can help firms react more quickly and can also provide a competitive advantage.
- **Responsiveness to data requests:** The need to have the capability to respond to internal and regulator data requests is a major driver for aggregating data and using tools such as grid computing and in-memory analytics to process queries and requests more quickly. We have observed instances where firms establish centralized data repositories for all legal matters that are pending or in flight, across all business units of the bank. The objective is to leverage centralized data and associated analysis, to improve responses to compliance and legal data requests. Firms can standardize processes across multiple departments including legal, IT, and risk so that centralized data can be accessed across the firm.
- **Dynamic reports and dashboards:** Increasingly, firms are using more sophisticated visualization tools to help analysts explore data using patterns, in addition to statistical models. Firms are also increasing their use of visualizations on smart mobile devices such as tablets (on self-service basis) to enable senior management and risk managers to see summary details and be able to click through data sets to drill down for detailed information.

## Action Points And Recommendations

In our experience, ideas for innovation and enhancement of business and risk capabilities are not in short supply. However, the limiting factors typically revolve around a firm's vision, discipline, and culture for executing digitization initiatives – these are usually the biggest stumbling blocks. Hence, firms must bear in mind the following factors for success.<sup>8</sup>

- **Focus on experiences of both internal and external clients.** Firms must follow digital trends to understand their potential impact on client and end-user behavior, their decision-making priorities, how they engage with a firm, and what they expect from products and services. This principle applies both to client-facing processes as well as internal services like risk management. To guide efforts in this area, firms can undertake digital maturity assessments to help leadership teams appreciate the challenges posed to their particular businesses and identify new, digital ways to engage with client groups – internal or external to the firm. This will help digitization programs cast a clearer vision from the top, and overcome the (conventionally) siloed nature of existing organizational constructs and technology applications.

- **Digitize internal risk, audit, and compliance management operating models to improve process orchestration and STP from the outside in.** Digital requires a fundamental change in the banks' operating model. Delivering the desired customer experience in the digital world is impossible without changes in products and services, organization, and technology. In the context of risk, compliance, and audit functions, the collaboration model and crossover activities with internal stakeholders (including frontline business units, IT and operations, finance, compliance, and audit), need to be clearly defined and delineated. Based on role requirements and business use cases, firms need to understand how to enable each employee group to quickly find and access the information they need, and to ensure users can assess the trustworthiness of the information when they find it.

There are also opportunities to use workflow and process management tools to automate key processes (for example, limits detection, escalation, and approval). The use of digital forms and imaging technology to capture and store documents can eliminate the use of paper in information management. Tapping into mobile, connectivity, social, and cloud-based technologies can also result in smarter, more efficient interactions, as well as exchanges of data and documents across organizations (for example, between financial firms and their supervisors).

- **Build and strengthen digitally-oriented risk data and analytics Centre of Excellence (CoE).** Given the increasing opportunities for digital to change risk management and compliance operations, firms should institute the right organizational approach to drive and embed new practices, especially around the use of data, analytics, and insights. The implementation of a center of excellence for digital, risk analytics, and data is to ensure that firms drive, grow, and evolve strategies to digitize risk processes and drive pilot initiatives.

Depending on the degree of maturity for data and analytics enablement, firms can explore different enabling environments and operating models to ensure better alignment of data and analytics initiatives and resource allocation, without disrupting day-to-day production activities and deadlines for regulatory compliance requirements. For example, analysts can be allocated to business units throughout the organization, with their activities being coordinated by a CoE. When implemented correctly, firms can achieve a flexible model with the right level of centralization, but at the same time, be able to add value to business units and divisions.

- **Incorporate flexibility and agility in your operating models, both business and technology.** Digital demands are just too different from traditional IT. Banks cannot afford to take a year to launch a new product with quarterly updates. New apps and digital products have to be launched in a few months and updated every few weeks. To cope with such demands, many IT organizations are considering setting up two different teams — one dedicated to digital initiatives, and another for traditional day-to-day tasks. This concept is sometimes referred to as 'two-speed IT'.

Indeed, given the wide-reaching impact of digital on business, an organizational transformation becomes paramount. It will be impossible to deliver a seamless customer and brand experience across all points of interactions with existing channel and product silos. To break down these silos, digital transformation needs to become a CEO-level initiative.

Digital demands are just too different from traditional IT. Banks cannot afford to take a year to launch a new product; this needs to be done in a few months and updated every few weeks.

Many banks recognize this and are dealing with it in a number of different ways. In some cases banks also set up digital CoEs, consolidating all relevant digital know-how in one place. Such digital hubs typically report directly to the CEO or other C-level executives, and are often located outside the regular corporate campus premises to create a separate, 'digital' working environment similar to Google and other digitally advanced companies. This is much like the early days of the internet, when banks established standalone online groups to deliver a web presence.

When implementing change initiatives, business and IT must look to understand both the granular detail and the big picture in order to drive changes on an iterative, incremental basis, by employing agile technology development methods. Firms should ensure that change is business-led rather than merely an adoption of new digital technologies.

- **Implement a cohesive applications strategy to overcome legacy constraints.** In most retail and wholesale banking, and capital markets trading functions, market participants described technology architectures and applications within their organizations as fragmented and operationally complex. After decades of product and service variation, organizational mergers, channel diversification, and geographic and operational expansions, financial institutions are often encumbered by layers on layers of technology.

At the same time, addressing the issue of legacy infrastructure requires firms to be ruthless in combating the obstacles associated with technology fiefdoms, organizational inertia, functional tradeoffs (in consolidating systems), and keeping the business running as is during migration phases. When it comes to risk technology specifically, getting an enterprise-wide picture of both macro and micro risk is difficult. Since the financial crisis, risk management capabilities have taken the center stage, unlike the reactive approach so far. To enhance these capabilities, firms need to craft and execute IT strategies to:

- Reverse misaligned decisions around a lack of standards, rationalizing portfolio of applications, and removing IT complexities (for example, create a lean front to back, design horizontal architecture stacks, remove complexity, and retire overlapping legacy applications).
- Reunify risk and finance data, either physically (for example, replacing or consolidating applications) or logically (for example, employing a reporting or business intelligence tool to aggregate information).
- Ensure that architecture and data delivery mechanisms along the value chain can deliver to real-time requirements.
- Standardize components, information definitions, and workflows, such as embracing industry reference standards for customer products, formatting, and interfaces (LEI, UPI, USI, FpML).
- **Ensure that the data middleware layer is fit for purpose.** Similar to developing real-time risk management capabilities, it is important for firms to chart a roadmap to ensure that data integration and data access facilities for risk systems are loosely coupled. Moreover, these systems need to be flexibly integrated, especially at junctures where risk information is weaved in, to support effective decision-making. In a digital world where smart mobile devices such as mobile phones and tablets are increasingly used on a direct access and self-service basis, the ability to easily integrate, orchestrate, and deliver 'live information' in a timely manner is a source of competitive advantage.

- **Be clear about the context of how economic value will be derived.** Firms must focus on understanding the economics of how digitization could impact risk operations and build business use cases for enhanced levels of digitization. In most cases, when applying concepts around digital, firms will often need to reexamine how existing risk and compliance processes should be enhanced or reengineered in line with new digitalized customer and transactional workflows. Figure 7 provides a framework to illustrate how various digital levers are intertwined, opportunities for digital risk management, and compliance operations, and where economic value can be derived in the context of broader business objectives:

1. Revenue enhancement, driven by customer retention and penetration, increased consumption, new products, and optimized pricing
2. Risk cost mitigation, leading to lower credit losses, reduced fraud, and optimized liquidity, and operational and conduct risk management
3. Operational cost reduction, driven by a redesign of the distribution network, lower transaction, control, as well as servicing costs, and streamlined regulatory reporting

#### Digital value levers

**1**

##### REVENUE UPLIFT

- Stabilised or increasing revenue pool driven by
- a. Customer satisfaction (customer loyalty/retention)
  - b. Customer interaction more frequent
  - c. Customer penetration (better cross- and upsell / improved lead into sales conversion)
  - d. Customised pricing
  - e. New products/revenue streams

**2**

##### RISK COST MITIGATION

- More informed decision making and portfolio management leading to
- a. Lower credit losses
  - b. Reduced fraud costs
  - c. Optimized liquidity, operating, and conduct risk management

**3**

##### OPERATIONAL COST REDUCTION

- Shrinking or stable operational cost base driven by
- a. Redesign of the branch network (smaller and more differentiated between advisory and transaction)
  - b. Lower transaction and service costs
  - c. Streamlined regulatory reporting

"Digital" needs to create profit rather than purely a retention strategy to justify scale and frequency of investment

**Figure 7: Digital levers driving demonstrable and sustainable economic value**

Source: Celent8

For example, to design risk control and supervisory processes associated with a lending or trading business, firms must design workflows for the control function in relation to how it can enable and complement business onboarding, KYC, underwriting, and fraud workflows on an end-to-end basis, instead of merely focusing on risk and compliance related objectives alone.

In short, digital risk management operations need to be thought through, planned, and implemented in the context of a profit-driven, rather than purely a retention-based strategy. Financial institutions are beginning to invest in digital initiatives on a larger scale, and in order to fully realize the benefits associated with digitization initiatives, firms will need to consider all three levers together – revenue enhancement, risk cost reduction, and operational cost optimization.

Overall, when planning and implementing changes associated with digitization, firms have to be mindful that these require a fundamental shift in banks' operating models from the outside in. To deliver a superior customer experience and minimize risks in the digital world, the total proposition needs to be enabled by changes in products, services, and organizational configurations, supported by accompanying efforts to digitally enable risk management and compliance functions within a financial firm's internal boundaries.

Digital risk management initiatives need to be thought through, planned, and implemented in the context of a profit-driven approach, rather than purely a retention-based strategy.

## Sustaining the Direction and Momentum of the Journey

### Sustaining Advantage And Charting A Strategic Path To Operational Maturity

As we consider next generation operational capabilities, we see competitive and regulatory pressures driving the industrialization agenda around risk data and platforms, with enhanced requirements for infrastructure and platform capabilities to meet emerging standards for a new financial ecosystem. This is already upon us, but firms on the whole still need to address maturity gaps in many parts of the information delivery value chain.

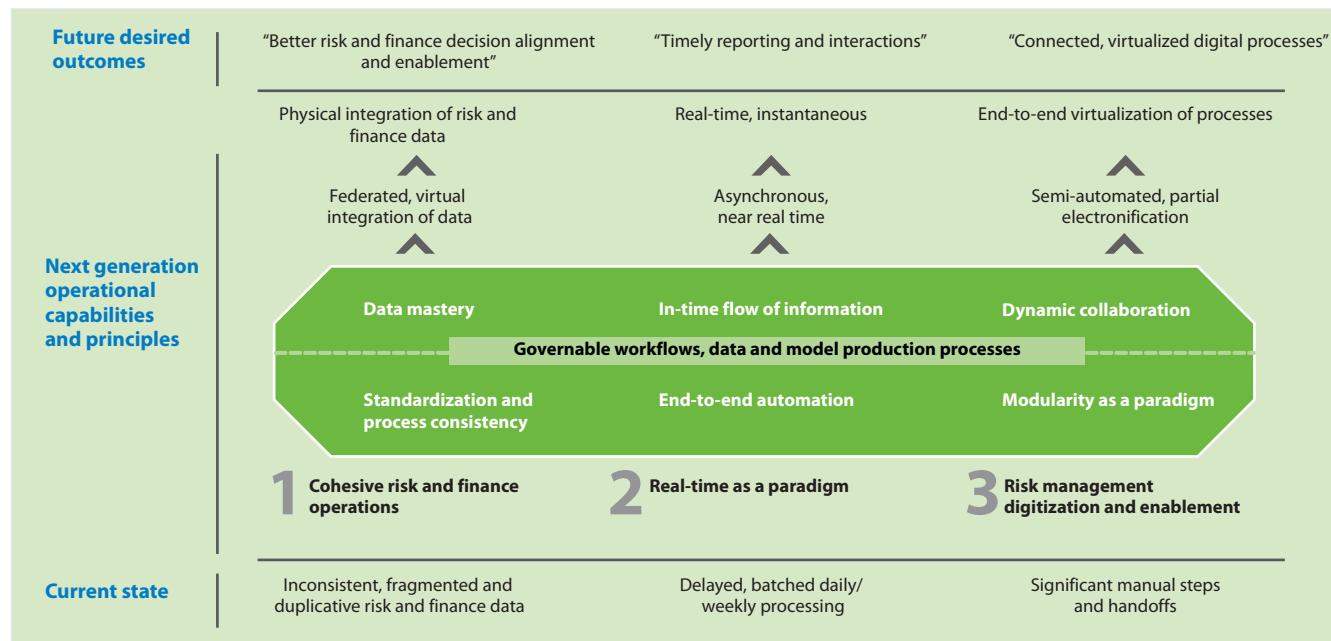


Figure 8: Industrialization of Risk IT/Operations: Sustaining the competitive advantage

Source: Celent<sup>6</sup>

In order to sustain momentum and continue toward digitization, firms must be guided by seven strategic principles to underpin the development of next generation capabilities:

- **Data mastery.** Firms need to focus on information integrity and data quality. Here, leading practices start with firms appointing a senior executive in charge of data (for example, Chief Data Officers) to drive data management activities along a cohesive path to industrialization — in terms of organizational stewardship, enterprise data and metadata standards, and total quality management initiatives around risk operations, as well as policy, training, and business-driven metrics to enable monitoring and governance effectiveness in various business units and functional data domains.
- **Standardization and process consistency.** Standardizing processes, components, and information definitions is simple but often overlooked by means of creating consistency in large, diverse financial services organizations. Standardized procedures cut costs by reducing the amount of day-to-day micromanagement required; they facilitate consistency of processes and decrease the chance of errors and operational losses, while providing templates that facilitate expansion and outsourcing.
- In-time flow of information. There are several facets to this. Firstly, to have IT or data architectures capable of providing continuous and/or event-based real-time information about emerging risks and uncongenial incidents. Secondly, to design user interactions and related interfaces such that time-critical early warning and alert mechanisms are not lost in the sea of information and data. End-to-end automation. Much has been said about the need for automation in general but this includes moving toward an automated, end-to-end production of risk information that reduces replication of data, manual interfacing, or non-digital and/or non-machine friendly forms of information.
- Modularity as a paradigm of operations. Promotes exchange, reuse and agile deployment of component processes, functional capabilities, and data in order to achieve faster product-to-market. In the context of risk technology, adopting a modular approach translates to the provision of risk management services to support product development, distribution, and transaction capabilities.
- Dynamic collaboration tools. Just as social media has altered the paradigm for information sharing, connecting, and collaboration, the manner that risk, finance and compliance functions interact with the rest of the business could be changed. Standardized dashboards for all frontline business and risk managers can be utilized to exchange daily results with central risk teams in order to enable sharing of information, effective collaborations, shared judgment calls, and joint responses. Firms can build communities of risk practices around domain and content areas between front office, product control, and risk groups, where people can follow or share information, add their own tags and comments to personalized versions of the reports they follow, set individual soft or hard limit triggers (beyond the firm's formal limits), and so on.
- Governable workflows, data, and model production processes. For strong data models and governance processes, firms must invest in next-generation data modeling and/or documentation tools to improve collaboration and consistency, as well as functionalities to improve data transparency and traceability across the lifecycle of data, calculation, and reporting process. Firms now need to demonstrate that they have a handle on operational competencies for managing the lifecycle of models across development, implementation, usage, and validation activities. Regulators require firms to document not only financial models employed, but also the evidence behind model-based decisions: to justify changes in assumptions and planning parameters, to demonstrate where decisions were taken, by whom, and the rationale behind the change made.

In the future, risk information production function will operate like a factory. Already, regulatory and business imperatives for most tier-1, systematically important institutions make these characteristics mandatory. However, the continued mainstreaming of collectively viable technology by large financial institutions, software vendors, and service bureaus (for example, around distributed or parallel computing models, virtualization, cloud, in-memory data and analytics) will lower production unit costs and provide scaled access even for lower-tier firms, in the times to come.

Continuous mainstreaming of advanced technologies by financial institutions, software vendors, and service bureaus will lower production costs and provide access to even low-tier firms.

## Looking Forward

In recent years, the financial industry's efforts to comply with regulation and structural reforms have led to several changes in risk management practices. Much has been achieved but market expectations have also risen. At a juncture where the relentless stream of post-crisis regulation is coming to a pause, firms need to still continue to find effective ways to consolidate, optimize, and innovate to sustainably operate in the evolving regulatory terrain for strategic advantage. Regulatory-led risk management alone will not automatically translate into a source of competitive advantage.

Firms must seize the opportunity to stimulate and infuse innovative ideas in the midst of mandatory business and regulatory investments. This means building strategic foundations around enabling effective risk-aligned financial management, timely reporting for interactive risk monitoring and management, and digital-ready risk operations where latent sources of risk and operational vulnerabilities can be plugged, and erosion of returns from regulatory can be mitigated more successfully.

Firms that build the right foundations have the ability to discern threat signals earlier, and are therefore better positioned to formulate preemptive responses when situations deteriorate. Faster responses translate into better preparation, and better preparation into increased chances to seize the right opportunities, and to protect a financial firm's franchise. Now is the time to prepare.

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